



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/015,598	12/17/2001	Makoto Shizukuishi	108235-00001	4907

7590 05/18/2005

ARENT FOX KINTNER
PLOTKIN & KAHN, PLLC
Suite 600
1050 Connecticut Avenue, N.W.
Washington, DC 20036-5339

EXAMINER

YODER III, CHRISS S

ART UNIT	PAPER NUMBER
----------	--------------

2612

DATE MAILED: 05/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/015,598

Applicant(s)

SHIZUKUISHI, MAKOTO

Examiner

Chriss S. Yoder, III

Art Unit

2612

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 December 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-22, and 23-28 is/are rejected.
- 7) ☒ Claim(s) 2 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "Solid state image sensor having a single-layered electrode structure".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1 and 3-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Ohsawa et al. (US Patent # 5,210,598).
2. In regard to claim 1, note Ohsawa discloses the use of a solid state image sensor, comprising a plurality of transducer column groups (figure 1: 14, there are multiple columns of transducers), each of which is composed of a first photoelectric transducer column wherein a plurality of photoelectric transducers are disposed at given intervals in a given direction (figure 1: 14), and a second photoelectric transducer column wherein a plurality of photoelectric transducers are disposed at said given intervals in the said direction (figure 1: 14, there are multiple columns of transducers), the second column being disposed so as to be shifted from the first column by a given amount in said given direction (figure 1: 14, each column is shifted from the first column,

Art Unit: 2612

wherein the given direction is considered to be the vertical direction for each column), wherein transfer registers are disposed between the respective photoelectric transducer columns so as to invade spaces between the respective photoelectric transducers in the photoelectric transducers columns adjacent to each other and so as not to contact each other (figure 1: 16, each transfer register 16 is placed between transducer columns), the solid state image sensor further comprising a plurality of monolayer electrodes which pass between the photoelectric transducers and extend in a direction that intersects said given direction (figure 1: 20; the given direction is considered to be the vertical direction, and the electrodes intersect the given direction perpendicularly by passing between the transducers in the horizontal direction), and which are disposed so as to be a given distance apart from each other in such a manner that signal charges generated in the photoelectric transducers are transferred along the transfer registers (column 4, lines 5-10; the electrodes 20 serve as vertical charge transfer control electrodes of the CCD).

3. In regard to claim 3, note Ohsawa discloses that the spacing between the monolayer electrodes above the transfer registers is formed in a linear configuration (figure 1: 20, each electrode is linearly formed above the transfer registers 16), from one side edge of the transfer registers toward the other side edge of said transfer registers (figure 1: 20, the electrodes are formed in the direction perpendicular to the transfer registers 16).

4. In regard to claim 4, note Ohsawa discloses that the reflectivity of the monolayer electrodes is lower than that of metal aluminum itself (column 3, lines 65-67 Ohsawa

Art Unit: 2612

discloses that the monolayer electrodes are formed from polycrystalline silicon layers, and based on the properties of materials, polycrystalline silicon has a lower reflectivity than aluminum).

5. In regard to claim 5, note Ohsawa discloses that the monolayer electrodes are made of low-resistance polysilicon (column 3, lines 65-67).

6. In regard to claim 6, note Ohsawa discloses that the monolayer electrodes are formed by stacking a plurality of electrode materials (column 9, lines 3-16; and figure 13: 108, 110, and 112).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 7-16, 19-22, and 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohsawa et al. (US Patent # 5,210,598) in view of Hokari et al. (US Patent # 6,618,087).

8. In regard to claim 7, note Ohsawa discloses the use of a solid state image sensor, wherein a plurality of photoelectric transducer columns (figure 1: 14, there are multiple columns of transducers) having a plurality of photoelectric transducers disposed in a given direction at given intervals (figure 1: 14; the given direction is considered to be the vertical direction), are arranged in parallel (figure 1), and transfer registers are disposed between the respective photoelectric transducer columns (figure

Art Unit: 2612

1: 16, each transfer register 16 is placed between transducer columns), the solid state image sensor further comprising a plurality of monolayer electrodes which pass between the photoelectric transducers and extend in a direction that intersects the given direction (figure 1: 20; the given direction is considered to be the vertical direction, and the electrodes intersect the given direction perpendicularly by passing between the transducers in the horizontal direction), and which are disposed to sandwich given gaps therebetween in such a manner that signal charges generated in the photoelectric transducers are transferred along the transfer registers (column 4, lines 5-10; the electrodes 20 serve as vertical charge transfer control electrodes of the CCD), and a light-shielding film formed above the monolayer electrodes and having light-transmitting portions through which light received in light-receiving areas of the photoelectric transducers is transmitted (column 4, lines 48-51; and figure 2: 30). Therefore, it can be seen that the Ohsawa device lacks the use of a nonconductive light-shielding film formed above the monolayer electrodes. Hokari disclose the use of a nonconductive light-shielding film formed above the monolayer electrodes (column 7, line 66- column 8, line 5; and figure 8: 20). Hokari teaches that the use of a nonconductive light-shielding film formed above the monolayer electrodes is preferred in order to reduce the capacitance between the electrode layer and the light shielding film and as a result of that reducing the total parasitic capacitance (column 8, lines 9-13). Therefore, it would have been obvious to one of ordinary skill in the art to modify the Ohsawa device to include the use of a nonconductive light-shielding film formed above the monolayer electrodes as suggested by Hokari.

Art Unit: 2612

9. In regard to claim 8, note Ohsawa discloses the use of a solid state image sensor, comprising a plurality of transducer column groups arranged in parallel (figure 1: 14, there are multiple columns of transducers), each of which is composed of a first photoelectric transducer column wherein a plurality of photoelectric transducers are disposed at given intervals in a given direction (figure 1: 14; the given direction is considered to be the vertical direction), and a second photoelectric transducer column wherein a plurality of photoelectric transducers are disposed at said given intervals in said given direction (figure 1: 14, there are multiple columns of transducers), the second column being disposed to be shifted from the first column by a given amount in said given direction (figure 1: 14), wherein transfer registers are disposed between the respective photoelectric transducer columns so as to invade spaces between the respective photoelectric transducers in the photoelectric transducers columns adjacent to each other and so as not to contact each other (figure 1: 16, each transfer register 16 is placed between transducer columns), the solid state image sensor further comprising a plurality of monolayer electrodes which pass between the photoelectric transducers to extend in a direction which intersects said given direction (figure 1: 20; the given direction is considered to be the vertical direction, and the electrodes intersect the given direction perpendicularly by passing between the transducers in the horizontal direction), and which are disposed to sandwich given gaps therebetween in such a manner that signal charges generated in the photoelectric transducers are transferred along the transfer registers (column 4, lines 5-10; the electrodes 20 serve as vertical charge transfer control electrodes of the CCD), and a light-shielding film formed above

Art Unit: 2612

the monolayer electrodes and having light-transmitting portions through which light received in light-receiving areas of the photoelectric transducers is transmitted (column 4, lines 48-51; and figure 2: 30). Therefore, it can be seen that the Ohsawa device lacks the use of a nonconductive light-shielding film formed above the monolayer electrodes. Hokari disclose the use of a nonconductive light-shielding film formed above the monolayer electrodes (column 7, line 66- column 8, line 5; and figure 8: 20). Hokari teaches that the use of a nonconductive light-shielding film formed above the monolayer electrodes is preferred in order to reduce the capacitance between the electrode layer and the light shielding film and as a result of that reducing the total parasitic capacitance (column 8, lines 9-13). Therefore, it would have been obvious to one of ordinary skill in the art to modify the Ohsawa device to include the use of a nonconductive light-shielding film formed above the monolayer electrodes as suggested by Hokari.

10. In regard to claim 9, note Ohsawa discloses the use of light-transmitting portions through which the light having a given wavelength received in light-receiving areas of the photoelectric transducers is transmitted, and light-shielding portions surrounding the light-transmitting portions are disposed in the same plane of the light-shielding film (column 4, lines 48-51; figures 2-3: 30).

11. In regard to claim 10, note Hokari discloses the use of light-transmitting portions through which the light having a given wavelength received in light-receiving areas of the photoelectric transducers is transmitted, and light-shielding portions surrounding the

Art Unit: 2612

light-transmitting portions are disposed in the same plane of the light-shielding film (column 4, lines 48-51; figures 2-3: 30).

12. In regard to claim 11, note Hokari discloses the use of a filter layer which transmits light of a given wavelength is formed above the nonconductive light-shielding film (column 9, lines 9-15; and figure 9: 113). Therefore, it would have been obvious to modify the Ohsawa device to include the use of a filter layer in order to designate each pixel as a specific color.

13. In regard to claim 12, note Hokari discloses the use of a filter layer which transmits light of a given wavelength is formed above the nonconductive light-shielding film (column 9, lines 9-15; and figure 9: 113). Therefore, it would have been obvious to modify the Ohsawa device to include the use of a filter layer in order to designate each pixel as a specific color.

14. In regard to claim 13, note Ohsawa discloses that all or a part of edge portions of the light-shielding film is extended toward the center of the light-receiving areas of the photoelectric transducers (figure 3: 30; 30 extends toward the center of the light receiving area 14).

15. In regard to claim 14, note Ohsawa discloses that all or a part of edge portions of the light-shielding film is extended toward the center of the light-receiving areas of the photoelectric transducers (figure 3: 30; 30 extends toward the center of the light receiving area 14).

16. In regard to claim 15, note Hokari discloses that the nonconductive light-shielding film is made of a resin material (column 8, lines 1-5).

Art Unit: 2612

17. In regard to claim 16, note Hokari discloses that the nonconductive light-shielding film is made of a resin material (column 8, lines 1-5).

18. In regard to claim 19, note Hokari discloses that the resin material is a material wherein a pigment which absorbs or reflects visible rays is dispersed in a resin (column 7, lines 10-12).

19. In regard to claim 20, note Hokari discloses that the resin material is a material wherein a pigment which absorbs or reflects visible rays is dispersed in a resin (column 7, lines 10-12).

20. In regard to claim 21, note Ohsawa discloses that the central positions of the light-transmitting portions are off centered from the central positions of the photoelectric transducers (figure 3: 30a-b and 14; the center of the transducers are not the same as the center between film 30, which creates the light-transmitting portions).

21. In regard to claim 22, note Ohsawa discloses that the central positions of the light-transmitting portions are off centered from the central positions of the photoelectric transducers (figure 3: 30a-b and 14; the center of the transducers are not the same as the center between film 30, which creates the light-transmitting portions).

22. In regard to claim 27, note Ohsawa discloses that the planar shape of the light-transmitting portions is that of a polygon having four sides (figure 2: 22).

23. In regard to claim 28, note Ohsawa discloses that the planar shape of the light-transmitting portions is that of a polygon having four sides (figure 2: 22).

Art Unit: 2612

24. Claims 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohsawa et al. (US Patent # 5,210,598) in view of Hokari et al. (US Patent # 6,618,087), and further in view of Furumiya (US Patent # 5,844,290).

25. In regard to claim 17, note the primary reference of Ohsawa in view of Hokari discloses the use of an imaging device as claimed in claim 15 above. Therefore, it can be seen that the primary reference fails to disclose that the resin material contains a photosensitive resin or gelatin. Furumiya discloses the use of an image sensor covered in resin material that contains a photosensitive resin (column 7, lines 33-54; and figure 5A: 15-2A). Furumiya teaches that the use of a resin material that contains a photosensitive resin is preferred in order to adjust the refractive index of the light-shielding layer (column 7, lines 48-50). Therefore, it would have been obvious to one of ordinary skill in the art to modify the primary reference to include the use of a resin material that contains a photosensitive resin as suggested by Furumiya.

26. In regard to claim 18, note the primary reference of Ohsawa in view of Hokari discloses the use of an imaging device as claimed in claim 15 above. Therefore, it can be seen that the primary reference fails to disclose that the resin material contains a photosensitive resin or gelatin. Furumiya discloses the use of an image sensor covered in resin material that contains a photosensitive resin (column 7, lines 33-54; and figure 5A: 15-2A). Furumiya teaches that the use of a resin material that contains a photosensitive resin is preferred in order to adjust the refractive index of the light-shielding layer (column 7, lines 48-50). Therefore, it would have been obvious to one of

Art Unit: 2612

ordinary skill in the art to modify the primary reference to include the use of a resin material that contains a photosensitive resin as suggested by Furumiya.

27. Claims 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohsawa et al. (US Patent # 5,210,598) in view of Hokari et al. (US Patent # 6,618,087), and further in view of Yamaguchi et al. (US Patent # 6,344,666).

28. In regard to claim 23, note the primary reference of Ohsawa in view of Hokari discloses the use of an imaging device as claimed in claim 15 above. Therefore, it can be seen that the primary reference fails to disclose that the arrangement pitch of central positions of the light-transmitting portions is made smaller than the arrangement pitch of central positions of the photoelectric transducers. Yamaguchi discloses that an image sensor wherein the arrangement pitch of central positions of the light-transmitting portions is made smaller than the arrangement pitch of central positions of the photoelectric transducers (column 5, line 54 – column 6, line 13; and figure 2: 22 and 26; the center portion of the sensor has the light-transmitting portion centered above the pixel, and the peripheral portion has the light-transmitting portion off center above the pixel). Yamaguchi teaches that the use of image sensor wherein the arrangement pitch of central positions of the light-transmitting portions is made smaller than the arrangement pitch of central positions of the photoelectric transducers is preferred so that the amount of light entering the center and the peripheral portions of the chip can be made equal. Therefore, it would have been obvious to one of ordinary skill in the art to modify the primary device to include the use of image sensor wherein the arrangement pitch of central positions of the light-transmitting portions is made smaller

Art Unit: 2612

than the arrangement pitch of central positions of the photoelectric transducers as suggested by Yamaguchi.

29. In regard to claim 24, note the primary reference of Ohsawa in view of Hokari discloses the use of an imaging device as claimed in claim 15 above. Therefore, it can be seen that the primary reference fails to disclose that the arrangement pitch of central positions of the light-transmitting portions is made smaller than the arrangement pitch of central positions of the photoelectric transducers. Yamaguchi discloses that an image sensor wherein the arrangement pitch of central positions of the light-transmitting portions is made smaller than the arrangement pitch of central positions of the photoelectric transducers (column 5, line 54 – column 6, line 13; and figure 2: 22 and 26; the center portion of the sensor has the light-transmitting portion centered above the pixel, and the peripheral portion has the light-transmitting portion off center above the pixel). Yamaguchi teaches that the use of image sensor wherein the arrangement pitch of central positions of the light-transmitting portions is made smaller than the arrangement pitch of central positions of the photoelectric transducers is preferred so that the amount of light entering the center and the peripheral portions of the chip can be made equal. Therefore, it would have been obvious to one of ordinary skill in the art to modify the primary device to include the use of image sensor wherein the arrangement pitch of central positions of the light-transmitting portions is made smaller than the arrangement pitch of central positions of the photoelectric transducers as suggested by Yamaguchi.

Art Unit: 2612

30. In regard to claim 25, note Yamaguchi discloses that the arrangement pitch of optical axis of microlenses arranged above the light-shielding film is made smaller than the arrangement pitch of central positions of the photoelectric transducers (column 5, line 54 – column 6, line 13; and figure 2: 22 and 27; the center portion of the sensor has the microlenses centered above the pixel, and the peripheral portion has the microlenses off center above the pixel).

31. In regard to claim 26, note Yamaguchi discloses that the arrangement pitch of optical axis of microlenses arranged above the light-shielding film is made smaller than the arrangement pitch of central positions of the photoelectric transducers (column 5, line 54 – column 6, line 13; and figure 2: 22 and 27; the center portion of the sensor has the microlenses centered above the pixel, and the peripheral portion has the microlenses off center above the pixel).

Allowable Subject Matter

32. Claim 2 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

33. As for claims 2, the prior art does not teach or fairly suggest the use of an image sensor solid state image sensor, comprising a plurality of transducer columns composed of a plurality of photoelectric transducers, transfer registers disposed between the photoelectric transducer columns, and a plurality of monolayer electrodes the photoelectric transducers, *wherein the spacing between the monolayer electrodes above the transfer registers is made narrower than the spacing between the monolayer*

Art Unit: 2612

electrodes above isolation regions for electrically isolating the transfer registers adjacent to each other

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US005682203A: note the use of microlenses with a different pitch for the pixels and the microlenses.

US004810619: note the use of aluminum and polysilicon as layers of a sensor.

US006822682B1: note the description of an image sensor having transfer registers and electrodes that are perpendicular.

US004680636: note the use of electrodes that overlap the pixels.

US006606124B1: note the description of an image sensor having transfer registers and electrodes that are perpendicular.

US004242700: note the description of an image sensor having transfer registers and electrodes that are perpendicular.

US006806904B1: note the description of an image sensor having transfer registers and electrodes that are perpendicular.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chriss S. Yoder, III whose telephone number is (571) 272-7323. The examiner can normally be reached on M-F: 8 - 4:30.

Art Unit: 2612

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wendy Garber can be reached on (571) 272-7308. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CSY
May 11, 2005


WENDY R. GARBER
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600